

Documentation of Items Used As Reference Materials, Known Materials, and Reference Collections

1 Scope

This document describes the procedures for the use, documentation, and verification of reference and known materials utilized to ensure the integrity of the materials through proper storage and use. This document applies to individuals who perform examinations in the disciplines of Hairs and Fibers, Geology, and Anthropology.

2 Definitions

A reference material is material, sufficiently homogeneous and stable with reference to specified properties, which has been established to be fit for its intended use in measurement or in examination of nominal properties.

A known material¹ is an item from an identified source. Known materials may be acquired for the purpose of comparison with an evidentiary sample or for inclusion in reference collection(s) utilized in training and/or to assist in identification in casework.

3 Reference and Known Materials Utilized by the Trace Evidence Unit (TEU) and/or Scientific and Biometrics Analysis Unit-Trace (SBAU-Trace)

3.1 Reference Materials

- Float Glass Reference Material (National Institute for Standards and Testing [NIST] standard reference material [SRM] 1831)
- Float Glass Reference Material (Bundeskriminalamt [BKA] FGS 1 from SCHOTT Glass, Germany)
- Trace Elements in Glass (National Institute for Standards and Testing [NIST] standard reference material [SRM] 612)
- Float Glass Reference Material (BKA FGS 2 from SCHOTT Glass, Germany)
- Float Glass Reference Material (BKA DGG from SCHOTT Glass, Germany)
- Container Glass Reference Material (NIST SRM 621)

¹ This is similar to, but distinguished from, using sampling to take a representative portion of an evidentiary sample and labeling it as a Known (*e.g.*, taking a known sample of a piece of evidentiary fabric).

- 1000 µg/ml Scandium Spectrometric Standard Solution (NIST-traceable)
- Glass Refractive Index Reference Material, (NBS melt 9012, or equivalent)
- Glass Refractive Index Reference Material, (BKA K5, from SCHOTT Glass, Germany)
- Locke Scientific standard reference glasses (Locke B1 through B12, Locke A1 through A5, Locke C1 and Locke C1, or equivalent)
- Holmium oxide Suprasil7 standard
- Didymium Suprasil7 standard
- Neutral density 0.1 Suprasil7 standard
- Neutral density 0.5 Suprasil7 standard,
- Neutral density 1.0 Suprasil7 standard
- XRD (X-ray diffractometry) Flat Plate Intensity Standard (NIST SRM 1976)
- XRD (X-ray Diffractometry) Fat Plate Intensity Standard (NIST SRM 1976c) |
- Pressed Silicon Powder XRD Line Position and Line Profile Standard
- Polystyrene Standard: 1.5mil (38 micron) matte-finish film mounted on a card (Traceable and/or non-traceable) (see section 3.1 of *Performance Monitoring Protocol for FT-IR Systems*)
- Standards Wheel in Nicolet 6700 or is50 Spectrometer Bench: 1.5mil (38 micron) matte-finish NIST traceable polystyrene standard and 1.0mil Schott NG11, National Physical Laboratory (NPL) traceable optical glass reference installed within the bench
- Pinhole Slide: Slide containing a metal disk with a 100 micron pinhole, an open hole, and a gold mirror
- XRF (X-ray Fluorescence) Calcium Hydroxyapatite Standard (NIST SRM 2910-a)

3.2 Known Material Reference Collections

- Cordage
- Fabric
- Animal Hair
- Human Hair
- Fibers
- Kitty litter
- Building materials
- Rocks
- Minerals
- Safe Insulation
- Glass
- Skeletons
- Skeletal Casts
- Histological slides
- Soil

4 Standards and Controls

4.1 Reference materials will be traceable to SI units or to certified reference materials, where practicable.

4.2 Reference materials will be used only during their certification period, if applicable.

4.3 The holmium oxide, didymium, and neutral density Suprasil⁷ standards must be returned for re-certification after the end of their certification period.

4.4 Reference materials will be used as described in the individual standard operating procedures requiring their use.

5 Storage

5.1 Reference materials and reference collections should be stored in an appropriate container and stored according to manufacturer instructions, if any.

5.2 Liquid reference materials will be stored in tightly closed containers.

6 References

- Trace Evidence Procedures Manual, *X-ray Powder Diffractometry Using X'Pert MPD*.
- Trace Evidence Quality Manual, *Performance Monitoring Protocol for Microspectrophotometers*.
- Trace Evidence Quality Manual, *Performance Monitoring Protocol for FT-IR Systems*.
- Trace Evidence Quality Manual, *Evidence Handling Procedures*.
- Trace Evidence Procedures Manual, *Refractive Index and Dispersion of Glass*.
- Trace Evidence Procedures Manual, *Elemental Analysis of Glass by Inductively Coupled Plasma - Optical Emission Spectrometry (ICP-OES)*.
- Trace Evidence Procedures Manual, *Refractive Index of Glass by GRIM*.
- Trace Evidence Procedures Manual, *Elemental Analysis of Glass by Laser Ablation Inductively Coupled Plasma – Mass Spectrometry (LA-ICP-MS)*.
- Chemistry Unit Instrument Operation and Support Subunit, *Performance Monitoring Protocol (QA-QC) for the Thermo Nicolet FTIRs*.
- FBI Laboratory Quality Assurance Manual.
- FBI Laboratory Operations Manual.

Rev. #	Issue Date	History
4	02/03/2020	Updated SBAU-Trace name in Scope and throughout. Changed 'geological' to 'geologically-derived' in Scope. Updated TE QA document titles throughout. Updated lists in Sections 3.1 and 3.2.
5	05/03/2021	Changed Scope from 'category of testing' to 'discipline' with updated discipline categories. Updated Reference Materials list to include NIST SRM 1976c and NIST SRM 612.

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Approval

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